AMENDMENTS TO THE DRAWINGS

The attached sheets of drawings include changes to Figure 1, 2A, and 2B. These sheets, which include Figures 1, and 2A/2B replace the original sheets including Figures 1, 2A/2B. In Figures 1, 2A, and 2B, a label --PRIOR ART-- has been added.

Attachment: Replacement Sheets

REMARKS

Claims 1 - 11 are currently pending in the application. Claims 1 - 4, 9, and 10 have been withdrawn from consideration; claims 5 and 8 have been amended and new claim 11 has been added. Accordingly, claims 5 - 8, and 11 are presented for reconsideration and reexamination in view of the following remarks.

In the outstanding Office Action, the Examiner objected to the drawings; and claims 5 - 8 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,783,242 to Hirata et al.

By this Amendment, Figures 1, 2A, and 2B have been amended; claims 5 and 8 have been amended; new claim 11 has been added; and the prior art rejection is traversed. Support for the amendments to claim 5 can be found for example, on page 31, line 27, page 32, line 3 and line 13 of the specification, and in Figures 14 - 19. Support for the amendments to claim 8 can be found for example, on page 33, lines 25 - 30, and in Figures 14 - 19. Support for new claim 11 can be found for example, on page 25, lines 17 - 22, and in Figures 9 and 10.

It is respectfully submitted that the above amendments introduce no new matter within the meaning of 37 U.S.C. § 132.

Objection to the Drawings

The Examiner objected to the drawings because Figures 1, 2A, and 2B should be designated by a legend such as --PRIOR ART--.

Response

In response, Figures 1, 2A, and 2B have been amended by adding the label --PRIOR ART-- because only that which is old is illustrated.

As Applicants have amended the drawings in compliance with 37 CFR 1.121(d) and 37 CFR 1.84(c), Applicants respectfully requests that the objection of the drawings be withdrawn.

Rejection under 35 U.S.C. § 102(e)

The Examiner rejected claims 5 - 8 as being anticipated by Hirata et al.

Response

Reconsideration and withdrawal of the rejection is respectfully requested.

For a reference to anticipate an invention, all of the elements of the claimed invention must be present in the reference. The test for anticipation under section 102 is whether each and every element as set forth in the claims is found, either expressly or inherently, in a single prior art reference. *Verdegaal Bros. V. Union Oil Co. of California,* 2 USPQ2d 1051, 1053 (Fed. Cir. 1987. The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.,* 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must also be arranged as required by the claim. *In re Bond,* 15 USPQ2d 1566 (Fed. Cir. 1990).

Applicants submit that Hirata et al. fails to disclose each and every element of the claims.

According to the present invention, the reflective polarizing plates enable an optical system to be compact, lightweight, and easy to manufacture. In the image displaying apparatus of the first

aspect, the effective diameter of the color separating optical system is greater than that of the color combining optical system. See specification at page 6, line 9 to page 7, line 13.

The image displaying apparatus according to any one of the second and third aspects arranges the color separating optical system and the color combining optical system in upper and lower layers, respectively, to improve space efficiency in the image displaying apparatus. Any one of the second and third aspects optimizes optical paths of the beams injected into the steering mirrors, to minimize the size of the optical system. See specification at page 8, line 23 to page 9, line 22.

According to the fourth aspect, the optical axes of the primary color beams passing through the color separating optical system, reflective polarizing plates, and color combining optical system are substantially on the same plane. This minimizes the optical system as a whole and improves space efficiency. As a result, an image displaying apparatus employing the color separating-combining optical system of the fourth aspect can display images of good color balance. The color separating-combining optical system of the fourth aspect can employ a Philips prism as the color combining optical system, to minimize the size of the color combining optical system. Unlike the cross dichroic prism, the Philips prism has no central joints that may badly affect displayed images. See specification at page 9, line 22 to page 11, line 13.

A fifth aspect of the present invention provides an image displaying apparatus including the color separating-combining optical system of the fourth aspect, a light source configured to emit a beam containing at least three primary colors toward the color separating optical system of the color separating-combining optical system, and an image forming unit configured to receive the

composite beam from the color combining optical system of the color separating-combining optical system and form an image according to the received composite beam. As a result, the image displaying apparatus can display images of good color balance. The image displaying apparatus of the fifth aspect can employ a Philips prism as the color combining optical system, to minimize the size of the color combining optical system. See specification at page 11, line 14 to page 12, line 7.

The image displaying apparatus employs the reflective polarizing plate as a polarizing-separating unit unlike the image displaying apparatus of the conventional art that employs the cubic polarizing beam splitter prism as a polarizing-separating unit. The image displaying apparatus of the embodiment passes an illumination beam through the reflective polarizing plate to provide a p-polarized beam. The p-polarized beam is modulated and reflected by the reflective spatial light modulator, and the modulated-and-reflected beam is again injected into the reflective polarizing plate, which reflects an s-polarized beam that is used as an image displaying beam. The reflective polarizing plate has a wire grid face to reflect a beam. The wire grid face must sufficiently be flattened to display high-resolution images without astigmatism. See specification at page 18, paragraph beginning on line 28, page 34, lines 9 - 18, page 45, and paragraph beginning on line 25.

Hirata et al. discloses a projection apparatus and projection-type image display apparatus. Improved characteristics can be provided by forming the prisms in the color combining optical system with base materials having low birefringence as in the polarized light separation device described earlier in the reference. Of the optical combining prisms shown in FIG. 3, the prisms 10G, 10W can be formed using base material having the lowest photoelastic constant for light in the green wavelength range, the range with the highest visibility. This provides superior characteristics.

Also, further improvements can be provided by forming the prism 10R with a base material having the lowest photoelastic constant in the red wavelength range. Further improvements can be provided by forming the prism 10W with a base material with low photoelastic constants in the green wavelength range and the red wavelength range. See column 8, lines 34 - 51.

Hirata et al. has substantially the same configuration as the image displaying apparatus shown in Figure 1, which is prior art of the present invention.

Figures 1 and 4 of Hirata et al. reveal a configuration in that a cross dichroic prism 10W, 10R, 10G, 10B is disposed as color separating optical system in a lower layer, and the separated RGB beams from the color separating optical system are directed to a polarized light separation devices (glass prism type polarizing beam splitters) 1R, 1G, 1B in an upper layer by total reflection mirrors 7, 7 and dichroic mirror 8, respectively.

Amended independent claim 5 of the present application, recites a combination of features, *inter alia*, "...first to third wire grid type reflective polarizing plates for polarizing and separating the corresponding primary color beam guided by the color separating optical system into a linearly polarized beam of a first polarized state, transmitting and injecting the linearly polarized beam of the first polarized state into the corresponding reflective spatial light modulator, polarizing and separating a modulated-and-reflected beam from the corresponding reflective spatial light modulator into a linearly polarized beam of a second polarized state, and reflecting the linearly polarized beam of the second polarized state..."

Hirata et al. uses glass prism type polarizing beams splitters as polarization beam splitters, whereas the present invention uses wire grid type reflective polarization plates instead [*emphasis added*].

Although the description "polarized light separation device" in mentioned in column 10, lines 21 -31 of Hirata et al. to which the Examiner refers, it is described such that the polarized light separation device is directly joined to image display element 2. Further, it is apparent from the figures that the polarized light separation devices in Hirata et al. are glass prism type.

In contrast, reflective polarizing plates are employed for polarizing light separation devices in the present application. Accordingly, as described in page 8, lines 23 -28 of the specification of the present application realizes the fine angular characteristics, brightness and high contrast, miniaturization and reduction in weight.

Regarding claim 6, Hirata et al. uses a cross dichroic prism as color separating optical means (see dichroic mirror 9), whereas the present invention comprises a first dichroic mirror 207 for separating a three primary color beam into a first-second color beam and a third color beam, and a second dichroic mirror for subsequently separating the first-second color beam into a second color beam and a third color beam. See page 31, lines 16 - 23 of the specification of this application.

Regarding claim 7, which is pertinent to the installment of the reflective light modulation devices, Hirata et al. seemingly discloses the installment of three devices on a same plane, but lacks the explicit indication of such.

Meanwhile, the present invention indicates the configuration of the reflective light modulation device in Figures 9 - 12. Concretely, Figure 11 shows three reflective light modulation

devices 131, 132, and 133, which are installed on a substrate. Alternatively, as shown in Figure 12, the reflective light modulation device may be attached at three apertures on a substrate 145, respectively, where a reflective light modulation devices 130 may be attached on the lower surface of the substrate and a cover glass or a wavelength plate 123 are fixed on the upper surface thereof as shown in Figure 10.

Specifically, with the use of the materials having the thermal expansion coefficients equalized or approximated to that of the dichroic prism, the reduction of positional shift of the prism and the improved reliability and durability can be attained. See page 25, lines 17 - 22 of the specification.

Amended independent claim 8 of the present application, recites a combination of features, *inter alia*, "...first to third wire grid type reflective polarizing plates for polarizing and separating the corresponding primary color beam guided by the color separating optical system into a linearly polarized beam of a first polarized state, transmitting and injecting the linearly polarized beam of the first polarized state into the corresponding reflective spatial light modulator, polarizing and separating a modulated-and-reflected beam from the corresponding reflective spatial light modulator into a linearly polarized beam of a second polarized state, and reflecting the linearly polarized beam of the second polarized state;...the color separating optical system comprises first and third steering mirrors disposed to be substantially oriented in the same direction, and a second steering mirror disposed so that the optical axis of a beam injected into the second steering mirror is orthogonal to the optical axes of beams injected into the first and third steering mirrors,..."

The first, second and third steering mirrors 213, 214, and 215 are configured such that the first and third steering mirrors 213 and 215 are substantially oriented in the same direction, and the optical axis of a beam injected into the second steering mirror 214 is orthogonal to the optical axis of beams injected into the first and third steering mirrors 213 and 215. See page 33, lines 25 - 30 of the specification and Figures 14 - 19.

The configuration enables the effective utilization of the beam from a light source along with the miniaturization of the system. See page 8, line 29 to page 9, line 1 and page 33, lines 14 -24 of the specification.

It is respectfully submitted that Hirata et al. fails to disclose each and every element of independent claims 5 and 8.

Moreover, as claims 6 and 7 depend from independent claim 5, Applicants submit that these claims are allowable for at least similar reasons.

Therefore, Applicants request that the rejection of claims 5 - 8 under 35 U.S.C. § 102(e) be withdrawn.

NEW CLAIM 11

As new claim 11 depends from claim 7, which depends from amended independent claim 5, Applicants submit that this claim is likewise allowable for at least similar reasons.

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U.S.A.

We apologize for your inconvenience and our late response.
We will resend the complete facsimile.
We have already sent the confirmation by airmail.
Please check again and file by the due date, Oct. 22.
Thank you.
M&M

Re: U.S.Patent Application No. 10/797,483
Title: Image Displaying Apparatus and Color Separating-combining Optical System
Your Ref: 26046
Our Ref: JJVC-117-US

Dear Mr. Nath and Mr. Kang:

Thank you for your letter dated October 3, 2005 regarding the above-identified case.

Please proceed to respond to the outstanding Office Action in accordance with the instructions from our client as follows:

- Please amend the claims as our proposed claims attached,
- Please argue against the Office Action as below,
- Please take necessary steps at your end insofar as the substantial part of the invention is maintained, specifically with respect to the correction of figures and the error check of specification.

Grounds for amendment in claims

The amendment in claim 5 is based on the descriptions in line 27, page 31; line 3, page 32; line 13, page 32 of specification and figures 14-19. The amendment in claim 8 is based on the descriptions in lines 25-30, page 33 and figures 14-19. Newly added claim 7a is based on the description in lines 17-22, page 25 and figures 9 and 10.

Proposed arguments – in light of differences between Hirata (US 6,783,242) and claims 5-8 (figures 14-19)

Hirata has a substantially same configuration as the image displaying apparatus shown in figure 1, which is prior art of the present invention.

Figures 1 and 4 of Hirata reveal a configuration in that a cross dichroic prism 10W, 10R, 10G, 10B is disposed as color separating optical system in lower layer, and the separated RGB beams from the color separating optical system are directed to a polarized light separation devices (glass prism type polarizing beam splitters) 1R, 1G, 1B in upper layer by total reflection mirrors 7, 7 and a dichroic mirror 8, respectively.

The differences between claims 5-8 of this application and Hirata are explained below.

Regarding claim 5

Hirata uses glass prism type polarizing beam splitters as polarization beam splitters, whereas the present invention uses wire grid type reflective polarization plates instead.

Although just the description "polarized light separation device" is mentioned in lines 21-31, column 10 of Hirata to which the Examiner refers, it is described such that the polarized light separation device is directly joined to image display element 2. Further, it is obvious from the figures that the polarized light separation devices in Hirata are glass prism type.

In the meantime, reflective polarizing plates are employed for polarizing lght separation devices in the present application. Accordingly, as described in lines 23-28, page 8 of the specification, the present application realizes the fine angular characteristics, brightness and high contrast, miniaturization and reduction in weight.

Regarding claim 6

Hirata uses a cross dichroic prism as color separating optical means, whereas the present invention comprises a first dicroic mirror 207 for separating a three primary color beam into a first-second color beam and a third color beam, and a second dichroic mirror for subsequently separating the first-second color beam into a second color beam and a third

color beam. Please refer to lines 16-23, page 31 of the specification.

Regarding claim 7

This claim is pertinent to the installment of the reflective light modulation devices. Hirata seemingly discloses the installment of three devices on a same plane, but lacks the explicit indication.

Meanwhile, the present invention indicates the configuration of the reflective light modulation devices in figures 9, 10, 11 and 12. Concretely, figure 11 shows three reflective light modulation devices 131, 132 and 133, which are installed on a substrate. Alternatively, as shown in figure 12, the reflective light modulation devices may be attached at three apertures on a substrate 145, respectively, where a reflective light modulation devices 130 may be attached on the lower surface of the substrate and a cover glass or a wavelength plate 123 are fixed on the upper surface thereof as shown in figure 10.

Specifically, with the use of the materials having the thermal expansion coefficients equalized or approximated to that of the dichroic prism, the reduction of positional shift of the prism and the improved reliability and durability can be attained. Please refer to lines 17-22, page 25 of the specification.

Regarding claim 8

The first, second and third steering mirrors 213, 214, 215 are configured such that the first and third steering mirrors 213 and 215 are substantially oriented in the same direction, and the optical axis of a beam injected into the second steering mirror 214 is orthogonal to the optical axis of beams injected into the first and third steering mirrors 213 and 215. Please refer to lines 25-30, page 33 of the specification and figures 14-19.

The configuration enables the effective utilization of the beam from a light source along with the miniaturization of the system. Please refer to line 29, page 8-line1, page 9 and lines 14-24, page 33 of the specification.

As detailed above, Hirata fails to disclose the configuration specific to the present invention and thus the effects of the present invention. Therefore, those having a skill in the art should not anticipate the present invention based on the invention disclosed in Hirata.

If you have any question, please do not hesitate to contact us. Thank you for your kind support on the matter.

Very truly yours,
MIYOSHI & MIYOSHI

Taro Matsunami

Enclosure: Proposed Claims

Proposed Claims

5. **(Amended)** An image displaying apparatus comprising:

a light source for emitting a beam containing at least three primary colors;

first to third reflective spatial light modulators corresponding to the three primary colors, respectively;

a color separating optical system for separating the beam emitted from the light source into three primary color beams and guiding the three primary color beams toward the first to third reflective spatial light modulators through first to third steering mirrors, respectively;

first to third **wire grid type** reflective polarizing plates for polarizing and separating the corresponding primary color beam guided by the color separating optical system into a linearly polarized beam of a first polarized state, transmitting and injecting the linearly polarized beam of the first polarized state into the corresponding reflective spatial light modulator, polarizing and separating a modulated-and-reflected beam from the corresponding reflective spatial light modulator into a linearly polarized beam of a second polarized state, and reflecting the linearly polarized beam of the second polarized state;

a color combining optical system for combining the three primary color beams modulated by the reflective spatial light modulators and reflected by the reflective polarizing plates into a composite beam; and

an image forming optical unit for receiving the composite beam and forming an image according to the received composite beam.

6. The image displaying apparatus of claim 5, wherein the color separating optical system comprises:

a first dichroic mirror for separating the beam from the light source into a first-second primary color beam and a third primary color beam; and

a second dichroic mirror for separating the first-second primary color beam into a first primary color beam and a second primary color beam.

7. The image displaying apparatus of claim 5, wherein

the color combining optical system is a cross dichroic prism, the first to third reflective spatial light modulators are attached to a planar substrate at three locations around the cross dichroic prism that is also attached to the planar substrate, and beam incident faces of the reflective spatial light modulators are substantially on the same plane.

7a. (New) An image displaying apparatus of claim 7, wherein

the planer substrate comprises a material whose thermal expansion coefficient is equalized or approximated to that of the three-color-combining cross dichroic prism.

8. **(Amended)** An image displaying apparatus comprising:

a light source for emitting a beam containing at least three primary colors;

first to third reflective spatial light modulators corresponding to the three primary colors, respectively;

a color separating optical system for separating the beam emitted from the light

source into three primary color beams and guiding the three primary color beams toward the first to third reflective spatial light modulators through first to third steering mirrors, respectively;

first to third **wire grid type** reflective polarizing plates for polarizing and separating the corresponding primary color beam guided by the color separating optical system into a linearly polarized beam of a first polarized state, transmitting and injecting the linearly polarized beam of the first polarized state into the corresponding reflective spatial light modulator, polarizing and separating a modulated-and-reflected beam from the corresponding reflective spatial light modulator into a linearly polarized beam of a second polarized state, and reflecting the linearly polarized beam of the second polarized state;

a color combining optical system for combining the three primary color beams modulated by the reflective spatial light modulators and reflected by the reflective polarizing plates into a composite beam;

an image forming optical unit for receiving the composite beam and forming an image according to the received composite beam, and wherein

the color separating optical system comprises first and third steering mirrors disposed to be substantially oriented in the same direction, and second steering mirror disposed so that the optical axis of a beam injected into the second steering mirror is orthogonal to the optical axes of beams injected into the first and third steering mirrors, and

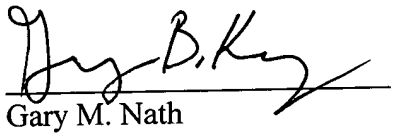
the optical axes of the beams traveling from the first to third steering mirrors to the first to third reflective spatial light modulators are parallel to one another, the planes of polarization of two of the beams are orthogonal or parallel to each other.

CONCLUSION

In light of the foregoing, Applicants submit that the application is now in condition for allowance. If the Examiner believes the application is not in condition for allowance, Applicants respectfully request that the Examiner contact the undersigned attorney if it is believed that such contact will expedite the prosecution of the application. Favorable action with an early allowance of the claims is earnestly solicited.

Respectfully submitted,

NATH & ASSOCIATES PLLC



October 20, 2005

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